

LYUBARSKIY, G.D.; IVANOVSKAYA, L.I.; ISAYEVA, G.G.

Catalytic activity of nickel catalysts. Part 1: Properties of alloy catalysts. Kin.i kat. 1 no.2:260-266 JI-Ag '60. (MIRA 13:8)

1. Fiziko-khimicheskiy institut im. L.Ya.Karpova.
(Catalysts, Nickel)
(Aluminum-nickel alloys)

88243

S/195/60/001/003/007/013
B013/B058

18.053

AUTHORS: Lyubarskiy, G. D., Ivanovskaya, L. N., Isayeva, G. G.,
Layner, D. I., Kagan, N. M.

TITLE: Study of the Catalytic Activity of Nickel Catalysts
II. Effect of the Admixtures of Transition Metals

PERIODICAL: Kinetika i kataliz, 1960, Vol. 1, No. 3, pp. 385 - 392

TEXT: In this paper the authors studied the effect of admixtures of transition metals to the nickel on its catalytic activity. It was the aim of the paper to clarify the effect of these admixtures to the alloy of nickel with aluminum or silicon on the specific activity of the skeleton catalysts obtained after the leaching out of aluminum. Series of nickel-aluminum alloys were prepared with various amounts of metal admixtures (titanium, chromium, vanadium, molybdenum, iron, copper, and cobalt) and with the same aluminum content (50% by weight). These ternary alloys were crushed, leached out, and tested according to the method described in Ref. 1. The activity of the samples was determined in a

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continuous-flow circulation apparatus by means of benzene hydrogenation. The experiments were conducted at temperatures of 27°C, 32°C, and 38°C and a hydrogen feed rate of 7 l/h per 1 cm³ catalyst. The initial benzene concentration was 1.5 mmole per 1 l benzene-hydrogen-vapor mixture. The surface was determined by means of the BET method after the adsorption of nitrogen. The studies showed that the addition of chromium, titanium, molybdenum and vanadium affects the activity of nickel aluminum catalysts only slightly. The thermal stability of the samples is sufficiently high. The catalytic activity of samples with chromium and titanium content is even increased through treatment with hydrogen at 200°C. The samples with molybdenum content are, however, less stable when heated and show reduced activity already at 150°C. The specific activity of nickel remains practically unchanged with an addition of up to 20 to 30 at% metal and on an average amounts to $1.7 \cdot 10^{-4}$ mol/h·m² at 38°C. The activity related to 1 g catalyst shows a slight increase (by 15 to 20%) for smaller amounts of admixtures (up to 5 to 7 at%). The observed steadiness of the specific

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Catalysts. II. Effect of the Admixtures
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activity of the catalysts studied can be explained by the fact that the metal admixtures mentioned form solid phases with nickel only to a limited extent. A study of the changes of the nickel-crystal parameter showed that through the addition of 3 at% titanium, 6 at% aluminum, 8 at% vanadium or 10 at% chromium, the lattice is only changed by 0.01 Å. In some cases (chromium, titanium), these admixtures cause an improvement of the properties important for the practice, such as stability, mechanical strength of the granules etc. The high activity of the alloyed catalysts studied permits to carry out the hydrogenation of benzene at temperatures close to room temperature. It was shown that with respect to their activity, the skeleton catalysts surpass other known nickel catalysts which were obtained through reduction of nickel oxides or -salts. The energy of activation, calculated from the temperature coefficients, remains almost constant and amounts to about 12 ± 1 kcal/mol, independent of the composition. The constancy of the energy of activation, observed in all catalysts studied, points towards a possibly equal mechanism of this reaction. On the addition of cobalt and iron, similar results were ob-

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Catalysts. II. Effect of the Admixtures
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tained as for other metals. There are 5 figures, 6 tables, and 11 refer-
ences: 5 Soviet, 4 US, 1 Belgian, 3 British, 1 French, and 1 German. X

ASSOCIATION: Fiziko-khimicheskiy institut im. L. Ya. Karpova
(Physicochemical Institute imeni L. Ya. Karpov)

SUBMITTED: December 26, 1959

Card 4/4

IVANOVSKAYA, L.N.; GORBACHEV, S.V.

Effect of solvents on the kinetics of electrochemical oxidation-reduction reactions. Part 1. *Zhur.fiz.khim.* 37 no.10:2305-2308 O '63.
(MIRA 17:2)

1. Khimiko-tekhnologicheskii institut imeni Mendeleeva, Moskva.

LYUBARSKIY, G.D.; KUL'KOVA, N.V.; BURSHTEYN, R.Kh.; ISAYEVA, G.G.;
IVANOVSKAYA, I.N.; SHURMOVSKAYA, N.A.

Specific activity of nickel catalysts and thiophene adsorption. Dokl.
AN SSSR 140 no.3:634-633 S '61. (MIRA 14:9)

1. Fiziko-khimicheskiy institut im. L.Ya. Karpova. Predstavleno
akademikom S.S.Meivedevym.
(Thiophene) (Adsorption) (Nickel)

IVANOVSKAYA, L.N.; GORBACHEV, S.V.

Effect of nonaqueous organic solvents on the kinetics of electrochemical redox reactions. Trudy MKHTI no.44:50-58 '64.

(MIRA 18:1)

Effect of the nature of solvents on the kinetics of electrochemical oxido-reduction. Electrolytic oxidation-reduction of the system $I_2 \rightarrow I_2I$ in water. Ibid.:59-62

Ivanovskaya, L. P.

3-6-18/79

AUTHOR: Pozhidayev, N.N., Dotsent

TITLE: The Institute and Production (Institut i proizvodstvo)

PERIODICAL: Vestnik Vysshey Shkoly, 1957, # 6, pp 70-71 (USSR)

ABSTRACT: The article describes the close cooperation between the Kiyev Technological Institute for Light Industry (Kiyevskiy tekhnologicheskii institut legkoy promyshlennosti) and the plants and factories of the Ukraine. Thus, for instance, the Candidates of Technical Sciences G.A. Piskorskiy, L. P. Ivanovskaya and N.A. Adamova in cooperation with Engineers Ye. A. Repenyuk and G. I. Muzychenko of the Kiyev Sewing Machine Plant imeni Smirnov-Lastochkin "Ukraina" (Kiyevskiy shveynyye fabriki "Ukraina" imeni Smirnova-Lastochkina), are working on the mechanization and automation of spreading cloth in the cutting rooms of the plant. The Institute is manufacturing a new kind of artificial fiber from the wastes containing animal albumen of the leather, meat, and fish industries. The samples of fiber obtained resemble in their outer appearance natural wool and are almost as durable.

The instructors of the Chair for Physics and Automation, B. I. Lutsyk and others have, in conjunction with the workers

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The Institute and Production

of the Kiyev Knitted Wear Factory imeni R. Luxemburg (Kiyevskaya trikotazhnaya fabrika imeni R. Lyuksemburg) designed a photoelectronic automatic brake for knitting machines. The device was sent to the All-Union Industrial Fair. In cooperation with the Central Scientific-Research Institute for the Knitting Industry (Tsentral'nyy nauchno-issledovatel'skiy institut trikotazhnoy promyshlennosti) and the Central Scientific-Research Institute for Textile Machine Construction (Tsentral'nyy nauchno-issledovatel'skiy institut tekstil'nogo mashinostroyeniya) the Chair has raised some principal problems upon which the further mechanization and automation of the knitting industry will depend.

Dotsent Ya. I. Yesipenko, in charge of the Chair for Machine Parts, has developed a standard drive with speed variation for conveyers used in the shoe industry. The Experimental Plant of the Ministry for Light Industry, Ukrainian SSR, has begun series production of this device.

Dotsent L. B. Peysakhzon, Candidate of Technical Sciences, L. L. Alekseyeva, Candidate of Economic Sciences, and G. S. Mesezhnikov have, in cooperation with the technical personnel of the Kiyev Shoe Factory No 1 (Kiyevskaya obuvnaya fabrika No 1), reorganized the work of the cutting room by applying a

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The Institute and Production

single-cradled shuttle conveyer (odnolyulechnyy chelnochnyy transporter). This resulted in an increase of production. The Dotsents I. V. Orlov and G. L. Trukhan are mentioned as having developed a new shoulder padding construction and a method of shaping patterns for the mass production of clothing. The Technical Council of the Ukrainian Ministry of Light Industry has approved the methods which are now undergoing tests at the House of Models.

ASSOCIATION: The Kiyev Technological Institute of Light Industry
(Kiyevskiy tekhnologicheskyy institut legkoy promyshlennosti)

AVAILABLE: Library of Congress

Card 3/3

TURCHINSKAYA, Ye.P., inzh.; IVANOVSKAYA, L.P., kand.tekhn.nauk, dotsent;
PAVLOV, A.I., kand.tekhn.nauk, dotsent

Methods of preparing the edges of thermoplastic fabrics in the
mass production of clothing. Report No. 1. Izv. vys. ucheb.
zav.; tekhn. leg. prom..no.2:105-111 '60. (MIRA 13:11)

1. Kiyevskiy tekhnologicheskii institut legkoy promyshlennosti.
Rekomendovana kafedroy tekhnologii shveytnogo proizvodstva.
(Clothing industry) (Textile fibers, Synthetic)

TURCHINSKAYA, Ye.P., inzh.; IVANOVSKAYA, L.P., kand.tekhn.nauk, dotsent;
PAVLOV, A.I., kand.tekhn.nauk, dotsent

Methods for processing the edges of thermoplastic fabrics in the
mass production of clothing. Report No.2: Izv.vys.ucheb.zav.; tekhn.
leg.prom. no.5:86-94 '60. (MIRA 13:11)

1. Kiyevskiy tekhnologicheskoy institut legkoy promyshlennosti.
Rekomendovana kafedroy shveytnogo proizvodstva.
(Clothing industry) (Plastics)

50462

S/020/60/132/02/26/067
B011/B002

18.9200
18.1250

AUTHORS: Bagaryatskiy, Yu. A., Ivanovskaya, L. Ye.

TITLE: The Shape of the Phase Diagram of Ni - NiAl - Mo Alloys

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 132, No. 2, pp. 339-342

TEXT: The authors mention that hitherto not even a ternary phase diagram of the alloys Ni - Al - Mo has been set up, not to speak of nickel alloys containing Al and Mo with even more components. The authors obtained the alloys by melting pure substances in a high-frequency furnace in an argon atmosphere. For 100 hours the alloys were homogenized in the vacuum furnace at 1200°. Those richest in aluminum were again homogenized for another 2 hours at 1500°. In accordance with the intended investigation of the alloys by means of 3 isothermal cross sections at 1200°, 1000° and 800°, the three series of samples were thermally treated as follows: 1) for 100 hours at 1200° → hardening; 2) at 1200° for 100 hours and another 100 hours at 1000° → hardening; 3) for 100 hours at 1200° and another 100 hours at 1000° plus 100 hours at 800° → hardening. The alloys obtained were microstructurally and radiographically examined. Table 1 gives the results obtained at 1200°. The corresponding isothermal cross section and the borderlines

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The Shape of the Phase Diagram of Ni - NiAl - Mo Alloys

of the γ -range at 800° and 1000° are shown in Fig. 1. The data on the binary systems Ni - Al and Ni - Mo (Refs. 7, 10, 11) were also used in the formulation. They are in good agreement with the authors' results on the binary alloys α - γ h at 1200°. In the alloy γ h, the δ -phase (NiMo) predominates in all three temperatures (Fig. 2a). Table 2 gives the angle of reflection of the δ -phase determined by the authors (by K_{α} Cu radiation). The relative intensity of the lines is also given. The δ -phase hardly dissolves Al. Alloy No. 29 (only containing 2 1/2 atom % of Al) thus already consists of γ - and α -phases (solid solution on the basis of Mo) (Fig. 2b). The same systems of lines are visible in the radiograph of alloy No. 15. Hence the conclusion contradictory to Ref. 3, that neither the existence of $\text{Ni}_3\text{Al} + \text{NiMo}(\gamma' + \delta)$ within the two-phase state, nor the existence of the solid solution $\text{Ni} + \text{Ni}_3\text{Al} + \text{NiMo}(\gamma + \gamma' + \delta)$ is possible. Table 1 shows that the results of the radiographic and microstructural investigations on the whole are in good agreement, provided the quantities of any phase are not too small for being radiographically proven. Exceptions: alloys No. 22 and 23 in which the β -phase cannot be determined radiographically. For unknown reasons it was impossible to determine the microstructure of alloys No. 23 and 24. Phases γ and γ' can only be distinguished in micro-photographs (Figs. 3b and 3g), while their radiographs gave identical pictures. There are

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IVANOVSKAYA, L.Yu.; RYABININ, A.A.; BARABANOVA, L.P.

Ursolic acid in plants. Zhur.ob.khim. 33 no.10:3446-3447
O '63. (MIRA 16:11)

1. Leningradskiy gosudarstvennyy universitet.

89082

S/169/61/000/001/010/011
A005/A001

3,9100

Translation from: Referativnyy zhurnal, Geofizika, 1961, No. 1, p. 34, # 1G238

AUTHOR: Ivanovskaya, M. V.

TITLE: On the Problem of the Connection of Geomagnetic Activity With the
Phase of the Moon

PERIODICAL: "Solnechnyye dannyye", 1959 (1960), No. 9, pp. 79-80

TEXT: It is noted that the conclusions of Suksdorf on the existence of a dependence of geomagnetic activity on the phase of the Moon, which were obtained from the observations of the Sodankule observatory in 1914-1944, do not have a statistical substantiation, and that the minimum of geomagnetic activity in new moon does not exist. The processing of the geomagnetic data from observations in the Tikhaya Bay during the period from 1934-1957 leads also to the conclusion on the non-existence of this connection. The curves of distribution of magnetic storms in days of synodic month, plotted from the data of the Greenwich and Pavlovsk observatories, corroborate also the absence of minima in new moon. The hypothesis of Suksdorf on the existence of a dependence of magnetic activity on lunar phases was based on the assumption of the existence of a Moon's magnetic

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A005/A001

On the Problem of the Connection of Geomagnetic Activity With the Phase of the Moon

field. The results obtained by the author are in accordance with the observations of the second Soviet space rocket, which established the absence of a magnetic field of the Moon.

Kh. Kanonidi

Translator's note: This is the full translation of the original Russian abstract.

Card 2/2

MARDERER, R.T.; IVANOVSKAYA, N.P.; ANOKHINA, A.P.; PONOMAREVA, V.M.

Epidemiological characteristics of poliomyelitis in Kuybyshev,
1952-1956. Vop.virus. 6 no.2:235 Mr-Apr '61. (MIRA 14:6)

1. Kuybyshevskiy institut epidemiologii, mikrobiologii i gigiyeny.
(KUYBYSHEV—POLIOMYELITIS)

IVANOVSKAYA, O. I.

IVANOVSKAYA, O. I.: "On the systematics of xerobiotic aphids of the subtribe Aphidina". Leningrad, 1955. Zoological Inst, Acad Sci USSR. Academic Council. (Dissertations for the degree of Candidate of Biological Sciences.)

SO: Knizhnaya Letopis' No. 50 10 December 1955. Moscow

IVANOVSKAYA, O.I.

Plant lice (Homoptera, Aphidoidea) harmful to Tamarix. Ent.
oboz. 35 no.2:371-376 '56. (MLRA 9:10)

1. Zoologicheskiy institut Akademii nauk SSSR.
(Plant lice) (Tamarisk--Diseases and pests)

IVANOVSKAYA, O.I.

Plant lice (Aphididea) of central Kulunda. Izv. Sib. otd. AN SSSR
no.8:126-133 '58. (MIRA 11:10)

1. Zapadno-Sibirskiy filial AN SSSR.
(Klyuchi District--Plant lice)
(Slavgorod District (Altai Territory)--Plant lice)

IVANOVSKAYA, O.I.

Aphids (Aphidoidea, Homoptera) on trees and shrubs in the
city of Novosibirsk. Izv.Sib.otd.AN SSSR no.4:133-137 '59.
(MIRA 12:10)

1. Zapadno-Sibirskiy filial Sibirskogo otdeleniya AN SSSR.
(Novosibirsk--Plant lice)

IVANOVSKAYA, O.I.

Some new species of xerophile plant lice of the subtribe Aphidina
(Homoptera, Aphididae). Ent. oboz. 38 no.3:628-633 '59.
(MIRA 13:1)

1. Institut biologii Sibirskogo otdeleniya AN SSSR, Novosibirsk.
(Kazakhstan--Plant lice) (Turkmenistan--Plant lice)

IVANOVSKAYA, O.I.

Xerophilous plant lice of the subtribe Aphidina from
Turkmenistan. Trudy Zool. inst. 27:293-296 '60.
(MIRA 13:9)

1. Institut biologii Sibirskogo otdeleniya Akademii nauk
SSSR, Novosibirsk.
(Turkmenistan--Plant lice)

IVANOVSKAYA, O.I.

Aphids (Homoptera, Aphidoidea) infesting plants in the shore
region of Novosibirsk Reservoir. Trudy Biol. inst. Sib. otd.
AN SSSR no.7:229-233 '61. (MIRA 15:3)
(NOVOSIBIRSK RESERVOIR REGION--PLANT LICE)

IVANOVSKAYA, O.I.

Plant lice (Homoptera, Aphidoidea) injurious to saltwort,
Ent. oboz. 40 no.4:881-883 '61. (MIRA 17:1)

SADOVSKIY, V. D. ; BORODINA, N. A. ; IVANOVSKAYA, S. I.

Mechanical Properties of Alloy Steels with Isothermic and Step-Hardening

Trudy IMM UFAN 5, 3, 1945

MALYSHEV, K. A. ; IVANOVSKAYA, S. I.

Growth of the Grain in Steel without Polymorphous Transformations.

Trudy IFM UFAN 10, 45, 1946.

MALYSHEV, K. A. ; IVANOVSKAYA, S. I.; BORODINA, N. A.

The Effect of Gases on the Growth of the Austenite Grain

Trudy IFM JAN 10, 48, 1946

IVANOVSKAYA, S. I.

The Effect of High Heating in Electric Hardening on the Structure and Mechanical Properties of Steel.

Ural Industrial Institute imeni Kirov, Sverdlovsk, 1947.

So: U-1837, 14 April 52.

"APPROVED FOR RELEASE: 08/10/2001

CIA-RDP86-00513R000619230014-5

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CIA-RDP86-00513R000619230014-5"

ARKHAROV, V.I.; VOLOVIK, B.Ye., professor, doktor, retsenzent; IVANOV-SKAYA, S.I., kandidat tekhnicheskikh nauk, otvetstvennyy redaktor; KOVALENKO, N.I., tekhnicheskiiy redaktor.

[Crystallography of hardened steel] Kristallografiia zakalki stali. Sverdlovsk, Gos. nauchno-tekhn. izd-vo lit-ry po cherno i tsvetnoi metallurgii, 1951. 143 p. [Microfilm] (MLRA 7:12)
(Steel--Metallography)

IVANOVSKAYA, S. I., SADOVSKIY, V. D.

Electric Welding

Effect of heating rate on the structural changes in electric welding of steel. Trudy Inst. fiz. met. No. 13, 1951.

9. Monthly List of Russian Accessions, Library of Congress, June 1953. Unclassified.

1.44.1 x 1.4. S. I.

Frontal Diffusion in Technical Iron. V. I. Arkharov, K. A. Efremova, S. I. Ivanovskaya, A. K. Shtol'ts and B. A. Yunikov. (Doklady Akademiya Nauk S.S.S.R., 1953, 89, 2, 268-270). [In Russian]. The diffusion of a number of elements (Ni, Pd, Al, Cu, Cr) in iron was investigated. The shape of the diffusion front (either straight or with infiltration along the intercrystalline boundaries) was shown to depend on the nature of the diffusing metal and the presence of small amounts of other elements in the iron.

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Inst. Phys. of Metals, Ural Affil, Acad. Sci. USSR

IVANOVSKAYA, S. I.

Metallurgical Abst.
Vol. 21 May 1954
Properties of Metals

③
*On the Effect of Certain Dissolved Elements on the Frontal
Diffusion of Silver into Polycrystalline Copper. V. I.
Arkharov, S. I. Ivanovskaya, and N. N. Skorniyakov (*Doklady
Akad. Nauk S.S.S.R.*, 1953, 89, (3), 1150-1152). [In Russian].
The effects on the diffusion of Ag of the presence of high
concentrations of Be, Sb, or Fe in the grain boundaries of
Cu (even though the overall concentration of the addn.
elements is low) were studied metallographically. Be
retards the diffusion in the grain boundaries, but the effect
is masked by the diffusion within the grains, and the diffusion
zone is smaller than that for pure Cu. Sb and Fe accelerate
diffusion and cause penetration along the grain boundaries,
which is more intense in the case of Fe. The effects of varying
mixtures of the three addn. elements were studied, and it was
shown that in all cases one of the elements had a predominant
effect. (Translated by the U.S. National Science Foundation
(NSF-tr-58)).—D. M. P.

Inst. Phys of Metals, Ural Affil, Acad. Sci., USSR

IVANOVSKAYA, S. I. and ARKHAROV, V. I.

"The influence of some admixture solutions on the frontal diffusion of silver in poly-crystalline copper", appearing in the "Works of the Institute on the Physics of Metals, Issue 16, Collection of Research Papers on Diffusion and Internal Adsorption in Metals and Alloys", (Trudy instituta Fiziki Metallov, vypusk 16, Sbornik Rabot Po Issledovaniyu Diffuzii I Vnutrennei Adsorbtsii V Metallakh I Splavakh), published by Ural Branch of the Academy of Science USSR, p 69, 1955.

IVANOVSKAYA, S. I. and ARKHAROV, V. I.

"Simple method of research on diffusion in solid metals", appearing in the "Works of the Institute on the Physics of Metals, Issue 16, Collection of Research Papers on Diffusion and Internal Adsorption in Metals and Alloys", (Trudy Instituta Fiziki Metallov, vypusk 16, Sbornik Rabot Po Isslendovaniyu Diffuzii i Vnutrennei Adsorbtsii v Metallakh i Splavakh", published by Ural Branch of the Academy of Science USSR p 53, 1955.

ARHAROV, V.I.; IVANOVSKAYA, S.I.

A simple technique for investigating diffusion in hard metals.
Trudy Inst.fiz.met.no.16:53-55 '55. (MLRA 9:2)
(Diffusion) (Physical metallurgy)

ARKHAROV, V.I.; YEFREMOVA, K.A.; IVANOVSKAYA, S.I.; SHEPOL'TS, A.K.;
YUNIKOV, B.A.

Shape of the diffusion front in the diffusion of nickel and other
elements in iron and on the effect of small quantities of dissolved
admixtures on this pattern. Trudy Inst. fiz.met. no.16:56-61 '55.
(Crystallography) (Metallography) (MIRA 9:2)

Influence of certain dissolved substances on silver diffusion
in silver-silver chloride. V. N. Arkharov, S. I. Ivanov
Zh. fiz. khim. 1964, 38, 1, 100-101

IVANOVSKAYA, S. I.

Category : USSR/Solid State Physics - Mechanical properties of crystals and poly-crystalline compounds E-9

Abs Jour : Ref Zhur - Fizika, No 1, 1957 No 1370

Author : Arkharov, V.I., Ivanovskaya, S.I., Kolesnikova, N.M., Fofanova, T.A.
Inst : Inst. of Metal Physics, Ural Branch, Acad. Sci. USSR; Ural Polytechn. Inst., USSR

Title : On the Mechanism of the Influence of Phosphorus and Molybdenum Admixtures on the Temper Brittleness of Steel

Orig Pub : Fiz. metallov i metallovedeniye, 1956, 2, No 1, 57-65

Abstract : Specimens of chrome-nickel structural steel with normal and increased content of P (within its solubility limits) were heat treated to produce a viscous or a brittle state. The fracture surfaces were chemically analyzed using the Tananayev chipless method. It was established that the content of P is substantially higher in the surface layer of brittle (inter-crystallitic) fracture than in that obtained in impact fracture (the latter has in the surface layer a content of P that is equal to the average value obtained by usual chemical analysis for the alloy as a whole). Analogous results were obtained with steels of the same composition, but with Mo added;

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Category : USSR/Solid State Physics - Mechanical properties of crystals and poly- E-9
crystalline compounds

Abs Jour : Ref Zhur - Fizika, No 1, 1957 No 1370

in these cases the enrichment of P in the surfaces of the brittle fracture is less than in steels without molybdenum. It is also established that the diffusion of phosphorus in steel is predominantly along the grain boundaries. The results are explained from the point of view of the theory of the internal inter-crystallitic adsorption of P (Arkharov, V.I., Dokl. AN SSSR, 1945, 50, 293).

Card : 2/2

AREKHAROV, V.I.; IVANOVSKAYA, S.I.; SKORNYAKOV, N.N.

Effect of dissolved silver on the frontal diffusion of silver in
polycrystalline copper. Trudy Inst. fiz. met. no.16:69-74 '55.
(Copper-silver alloys--Metallography) (MLRA 9:2)

ARKHAROV, V.I.; IVANOVSKAYA, S.I.; KOLESNIKOVA, N.M.; POPANOVA, T.A.

On the action mechanism of phosphorus and molybdenum admixtures on the
temper brittleness of steel. Fiz.met. i metalloved. 2 no.1:57-65 '56.
(MLRA 9:7)

1.Institut fiziki metallov Ural'skogo filiala AN SSSR i Ural'skiy po-
litekhnicheskii institut imeni S.M.Kirova.
(Steel alloys--Brittleness)

IVANDOVSKAYA, ~~III~~ D.I.

18(7) (p 1, 8.9) PHASE I BOOK EXPLOITATION SOV/1340

Akademiya nauk SSSR. Ural'skiy filial. Institut fiziki metallov

Voprosy teorii zharoprochnosti metallicheskih splavov (Problems in the Theory of Heat Resistance of Metal Alloys) Moscow, Izd-vo AN SSSR, 1958. 160 p. (Series: Its: Trudy, vyp. 19) 3,500 copies printed.

Eds.: Arkharov, V.I. and Sadovskiy, V.D.; Ed. of Publishing House: Rzhiznikov, V.S.; Tech. Ed.: Novichkova, N.D.

PURPOSE: This book is intended for specialists in the field of physical metallurgy.

COVERAGE: (Abstract of Article 1) The articles in this book constitute reports on extensive studies, conducted between 1949 and 1954 by the Institute of Physical Metallurgy at the Urals Branch of the Academy of Sciences, USSR, and devoted to the development of a general theory of heat resistance. A strong need was felt for such a theory because of insufficient knowledge of the physical mechanism of deformation

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Problems in the Theory of Heat Resistance of Metal Alloys SOV/1340

phenomena occurring in materials at high temperatures and the resultant difficulty of explaining the frequent difference in behavior of materials under test conditions and under actual operating conditions. The studies centered around the investigation of two basic assumptions: 1) localization of the processes of high-temperature plastic deformation in the zones of structural heterogeneity in a solid body undergoing deformation 2) internal adsorption of certain dissolved addition agents in the vicinity of these heterogeneities. The combined effect of these two phenomena on the heat resistance of the material is very important, because they are both localized in the same zones of the alloy. Actually, deformation develops in zones where the composition of the alloy, as a result of internal adsorption, is quite different from the average composition of the alloy. Another important factor in this connection is the fact that the effect of internal adsorption depends on previous heat treatment. From this it follows that small additions, frequently even those

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too small to be detected by analysis, may considerably change the heat resistance of the alloy, in varying degrees, depending on the heat treatment. It may be concluded that the main factor determining the heat resistance of a crystal is the interatomic bonds in the lattice, which bonds change according to the composition of the solid solution. The first stage of the investigations has been completed and forms the subject matter of the present collection of papers. Results indicate that the basic assumptions have been verified to a considerable extent. These two phenomena, as related to such heterogeneities as transcrystallite joining in polycrystalline alloys (under specified conditions of deformation) have proved to be of decisive importance and can be used as the basis of a hypothesis on how heat resistance is affected by the localization of deformation and by internal adsorption of addition agents in the vicinity of the more minute structural heterogeneities, i.e., the elements of subcrystallite structure (further work is indicated in this direction). Article 2 of the collection gives an

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extensive treatment of the basis of attack on the problem of heat resistance as investigated at the Institute, together with a detailed discussion of the guiding principle underlying all aspects of the study. Articles 3 and 4 attempt to explain the high adsorbability of small additions of a number of elements (e.g., Mo, W, Nb, Ti, Al, B) in iron-chrome-nickel austenite. Article 4 is concerned specifically with the diffusional mobility of one of the main components of the alloy (nickel) in transcrystallite transition zones, an important characteristic as regards heat resistance, inasmuch as plastic deformation at high temperatures [apparently] proceeds by a diffusion-type mechanism. Confirmation of this hypothesis was obtained by analysis of experimental data on high-temperature stress relaxation. This analysis is the subject of Article 10, whereas Article 9 is directly concerned with experimental work on the measurement of stress relaxation. The correlation between data on the transcrystallite diffusional mobility of nickel and on stress relaxation in the investigated alloys is

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given in Article 11. Article 8 describes methods of measuring high-temperature stress relaxation. Article 5 gives experimental data on the effect of small additions of elements of high internal adsorbability on creep in solid solutions. In this study it is shown that under conditions of low stresses, when the deformation is markedly localized in the transcrystallite transition zones, the adsorption-prone addition agent exhibits a strengthening effect. With high stresses, when the deformation is mainly of the slip type and is distributed throughout the crystallite, internal adsorption of the addition element ceases, but in certain cases of high stress the addition element may lower the resistance of the material to flow. Additional data on this question are given in Articles 6 and 14. Article 7 presents the results of an attempt at experimental microinterferometric confirmation of the occurrence of changes in the distribution of strain in the grain of metal containing small amounts of addition agents. The first small additions produce a marked effect on the deformation, which (with low stresses) is

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localized at the intercrystallite boundaries; the alloy is strengthened. An increase in the amount of the addition agents results in a coarsening of the crystallites, which increase the rate of flow. These results also agree with the basic hypothesis concerning the effect of internal adsorption on heat resistance and supplement the hypothesis with indications of the range of strain conditions under which the adsorption phenomenon plays a significant role. In the course of investigating stress relaxation, an unusual effect was observed in certain alloys, namely "negative relaxation", consisting in the growth of stresses with time, instead of the usual natural decrease. This effect has been explained by assuming that under the conditions of the relaxation test a phase transformation takes place in the material, resulting in a lowering of the specific volume (discussed in Article 12). This effect received further confirmation in the study reported in Article 13. In Article 16 the author examines the possibility of extending the basic idea of these investigations to subcrystallite structural heterogeneities, especially to those which arise and develop in aging. Since the majority of heat-resistant alloys undergo aging, the internal-adsorption phenomenon becomes a problem of great importance.

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AUTHOR: Arkharov, V. I.; Ivanovskaya, S. I.; Krivonosova, A. S.

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TITLE: Mechanism of the high-temperature oxidation of nickel

SOURCE: Fizika, metallov i metallovedeniye, v. 22, no. 6, 1966, 884-889

TOPIC TAGS: high temperature oxidation, nickel, metal scaling, metal grain structure, metal diffusion

ABSTRACT: As revealed by previous investigations (V. I. Arkharov, Z. A. Voroshilova, ZhTF, 1936, 6, 781; V. I. Arkharov, G. D. Lomakin, ZhTF, 1944, 14, 155), the scale forming in the process of the high-temperature oxidation of Ni contains a single phase (NiO) and consists of two morphologically different layers (Fig. 1): an inner layer formed by tiny randomly oriented (nontextured) crystals, and an outer textured macrocrystalline layer whose texture is characterized by the positioning of the (001) planes of NiO at an angle of $\sim 10^\circ$ to the outer surface of the scale and is the more distinct and macrocrystalline the higher the temperature is. Two different interpretations of these findings are possible: 1) the macrocrystalli-

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nity and texturedness of the outer layer are due to the recrystallization of the NiO forming at the metal-scale interface; 2) the principal role is played by the diffusion of Ni across the scale toward the outer layer of the scale. To clarify this question a series of specimens having the form of thin plates (0.2-0.5 mm thick) was completely oxidized until all the metal become transformed into scale and subsequently heated at the same temperature (1200°C) for an additional 30-40 hr, while another series of more massive (3-5 mm thick) specimens was oxidized so as to obtain a layer of scale ~0.2 mm thick on each. This layer was mechanically separated from the specimens and, as in the first part of the experiment, heated at 1200°C for an additional period of time. During the third series of experiments 0.1-0.3 mm thick layers of scale, separated from massive specimens of the metal were placed face downward on Ni metal (i.e. their outer layer now became the inner layer) and annealed in air. Microstructural and radiographic examinations were carried out during each stage of the experiments. Findings: on elimination of contact between Ni scale and Ni metal further heating of the scale led to no microstructural changes. On the other hand, when the scale remains in contact with the metal, microstructural changes in the scale continue in the course of further heating, with the microcrystals growing in size and the oxidation of the Ni metal continuing, i.e. the directional diffusion of Ni across the scale toward the outer layer takes place and plays the principal role as also demonstrated by the fact that in specimens with "inverted" scale the microcrystals grow into textured macrocrystals and the process of oxidation of the nickel coated

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Fig. 1. Microstructure of NiO scale (sectional view, magnification 120 times):
1 - outer layer; 2 - inner layer; 3 - metal

with the inverted scale continues, i. e. a diffusion flux across the scale occurs. The reason for the microcrystallinity and nontexturedness of the inner layer of the scale (at the scale-metal interface) is that at this interface the volume of the newly forming oxide virtually corresponds to the space freed in the reaction zone owing to the departure of the metal diffusing across the scale toward the outer layer of the scale. This correspondence is absent in the outer layer of the scale and it is this that accounts for the strain hardening and enlargement in volume of the newly forming crystals in this layer. Orig. art. has: 4 figures.

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